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मानक

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IS 7028-12 (2002): Performance Tests for Complete, Filled Transport Packages, Part 12: Vibration Tests Using a Sinusoidal Variable Frequency [TED 24: Transport Packages]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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पूरे भरित परिवहन पैकेज का कार्यकारिता परीक्षण
भाग 12 ज्यावक्रीय परिवर्ती आवृत्ति का प्रयोग करते हुए कंपन परीक्षण
(पहला पुनरीक्षण)

Indian Standard

PERFORMANCE TESTS FOR COMPLETE,
FILLED TRANSPORT PACKAGES

PART 12 VIBRATION TEST USING A SINUSOIDAL VARIABLE FREQUENCY

(First Revision)

ICS 55.180.40

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Part 12) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Transport Packages and Packaging Codes Sectional Committee had been approved by Transport Engineering Division Council. This standard was first published in 1987. The first revision has been undertaken to bring it in line with the ISO 8318 : 2000 'Packaging — Complete, filled transport packages and unit loads sinusoidal vibration tests using a variable frequency (*second revision*)' issued by International Organization for Standardization (ISO).

In this revision the following technical changes have been incorporated:

- a) Concept of unit load has been added.
- b) Clause on 'References' and 'Terminology' have been included.
- c) Variation in frequency is 'Constant logarithmic sweep rate' instead of 'Constant rate' earlier.
- d) Clauses on Test Methods 1 and 2 have been revised so as to align them with the ISO.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

Indian Standard

PERFORMANCE TESTS FOR COMPLETE, FILLED TRANSPORT PACKAGES

PART 12 VIBRATION TEST USING A SINUSOIDAL VARIABLE FREQUENCY

(*First Revision*)

1 SCOPE

1.1 This standard (Part 12) specifies two methods for carrying out a sinusoidal vibration test on a complete, filled transport package or unit load using a variable frequency. These tests may be used to assess the performance of a package or an unit load in terms of its strength or the protection that it offers to its contents when it is subjected to vertical vibration. Each may be performed either as a single test to investigate the effects of vertical vibration or as part of a sequence of tests designed to measure the ability of a package or unit load to withstand a distribution system that includes a vibration hazard.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of the standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
7028 (Part 1) : 2002	Performance test for complete filled transport packages: Part 1 Stack load test (<i>second revision</i>)
7030 : 1988	Identification of parts for complete, filled transport packages when testing (<i>first revision</i>)
7031 : 2002	Method of conditioning for testing of complete, filled transport packages (<i>second revision</i>)

3 TERMINOLOGY

3.1 For the purposes of this standard, the following term and definition shall apply.

3.1.1 *Test Item* — A complete, filled transport package or unit load.

4 PRINCIPLE

The test item is placed on a vibration table and vibrated at a frequency which varies at a constant logarithmic sweep rate between 3 Hz and 100 Hz, which may be

followed by vibration between ± 10 percent of the principal resonant frequencies within the range from 3 Hz to 100 Hz. The atmospheric conditions, the duration of the test, the peak acceleration, the attitude of the test item and its method of restraint are predetermined.

NOTE — When required, a load may be superimposed on the test item to simulate conditions at the bottom of a stack.

5 APPARATUS

5.1 Vibration Table

5.1.1 The vibration table shall be of sufficient size, rigidity and mass-carrying capacity, supported on mechanism that will maintain the surface horizontal during vibration.

5.1.2 The table shall be horizontal within a maximum angular deviation of 0.3° .

5.1.3 The apparatus shall meet the requirements and tolerances of 8.

NOTE — The table may be equipped with:

- a) low fences to restrict sideways and endwise movement during testing;
- b) high fences or other means of maintaining a superimposed load in position on the test item during testing; and
- c) means to simulate the method of restraining the test item during transit.

5.2 Instrumentation

5.2.1 The instrumentation shall comprise accelerometers, signal conditioners and data display or storage devices to measure and control the accelerations at the test surface. The instrumentation system shall have a response accurate to within ± 5 percent over the frequency range specified for the test.

5.2.1.1 Instrumentation may also be desirable for monitoring the response of the containers and packaged items. Sensors may be used to record velocities, amplitudes and frequencies of the contents in relation to the forcing vibration from the vibration table and possibly those on the outer surfaces of the package.

6 TEST ITEM PREPARATION

6.1 Fill the test item with its intended contents and ensure that the test item is closed normally, as if ready for distribution.

6.1.1 Simulated or substitute contents may be used on condition that the dimensions and physical properties of such contents are as close as possible to those of the intended contents. However, the closure should be the same as for distribution.

7 CONDITIONING

The test item shall be conditioned in accordance with one of the conditions described in IS 7031.

8 PROCEDURE

8.1 General

8.1.1 Wherever possible the test shall be carried out in atmospheric conditions identical to those used for conditioning, and particularly where this is critical to the materials or application of the test item.

8.1.2 In other circumstances, the test shall be carried out in atmospheric conditions which approximate those used for conditioning as closely as is practicable.

8.2 Method 1

8.2.1 Place the test item in the predetermined altitude on the vibration table (*see* 5.1). If the positioning of the test item on the platen of the vibration table changes the vibration movement, the vertical projection of the centre of gravity of the test item shall be as near as practicable to the geometrical centre of the platen of the vibration table; if the test item is not secured to the table it may be fenced. If a superimposed load is required, the loading procedure shall comply with IS 7028 (Part 1).

8.2.2 Subject the test item during a predetermined test duration to a predetermined vertical sinusoidal vibration with a frequency varying up and down between 3 Hz and 100 Hz at a sweep rate of 0.5 octave/Min.

8.2.3 The acceleration shall be measured with an accelerometer which is attached to the table as close as possible to the test item, but protected so that it will not be contacted by it.

8.2.4 In the event of a horizontal frequency component being present, its acceleration shall not exceed 20 percent of the value for the vertical component.

8.3 Method 2

8.3.1 Perform a resonance search test over one or more complete sweep cycles applying a suitable lower level of acceleration, typically in the range of 0.2 g to 0.5 g, and record the accelerations measured on the test item and on the table.

8.3.2 Determine the most severe and critical resonances, typically up to three.

8.3.3 Perform the endurance test at one of the defined resonances by sweeping over a frequency range varying between ± 10 percent of the defined resonance

frequencies. Repeat this procedure for other selected severe or critical resonances by applying a suitable acceleration for a predetermined duration.

NOTE — For the duration of the tests the various resonances may be tested for different durations.

9 TEST REPORT

The test report shall include:

- a) a reference to this Standard;
- b) name and address of testing laboratory and name and address of the customer;
- c) unique identification of the report;
- d) date of receipt of the test items and the date(s) of performance of the test;
- e) name, title and signature of persons accepting test responsibility for the test report;
- f) a statement to the effect that the test results relate only to the items tested;
- g) a statement that the report shall not be reproduced except in full without the written approval of the testing laboratory;
- h) number of replicate test items tested;
- j) a full description, including dimensions, structural and material specifications of the test item and its fittings, cushioning, blocking, closure or reinforcing arrangements, gross mass of the test item and the mass of the contents in kilograms;
- k) a description of contents, if simulated or substituted contents were used, full details shall be given;
- m) relative humidity, temperature and time of conditioning; the temperature and relative humidity of the area at the time of test, whether these values comply with the requirements of IS 7031;
- n) attitudes in which the test item was tested, using the method of identification given in IS 7031;
- p) duration of the tests;
- q) method(s) used, that is Method 1 and/or Method 2, the frequency range and peak acceleration used. If Method 2 was used, give the principle resonant frequency and, if appropriate, the second and third resonant frequencies;
- r) whether a superimposed load was used; if so, the mass in kilograms of the superimposed load and the period of time during which the test item was under load;
- s) method of restraint;
- t) type of apparatus used;
- u) any deviations from the test method described in this Standard; and
- v) a record of the results, including any observations which assist in the correct interpretation of the results.

ANNEX A**(Foreword)****COMMITTEE COMPOSITION****Transport Packages and Packaging Codes Sectional Committee, TED 24**

<i>Organization</i>	<i>Representative(s)</i>
Indian Institute of Packaging, Mumbai	SHRI P. V. NARAYANAN (<i>Chairman</i>)
Advance Packaging Pvt Ltd, Mumbai	SHRI DAMODAR SOMANI
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BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110 002	{ 323 76 17 323 38 41
Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700 054	{ 337 84 99, 337 85 61 337 86 26, 337 91 20
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160 022	{ 60 38 43 60 20 25
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